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Car Communication Computer (CCC)

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Model: E60, E61, E63, E64, E90, E91

Production: Start of Production MY 2004

OBJECTIVES

After completion of this module you will be able to:

- Recognize the CCC

- Identify the main CCC components

- Disassemble and repair the CCC

- Understand the operation of the CCC

Car Communication Computer

In principle, the structure of the car communication computer corresponds to that of a personal computer. In the same way as a personal computer, the car communication computer contains a processor as well as RAM modules and other peripheral components. Certain functions such as the voice input control system are integrated in the form of software in the car communication computer.

The car communication computer is the central control module for all applications. It is always coupled with the 8.8" split-screen central information display. The car communication computer also features the high variant of the controller with haptic feedback.

The car communication computer is based on a modular design, i.e. the main systems of the communication network are integrated in the form of modules in the car communication computer. It can be configured and expanded corresponding to requirements. At the time of market launch, the following modules/functions will be integrated in the car communication computer:

- Radio double tuner

- DVD navigation system, Professional (map presentation)

- Voice control system

- ASK functions

- MOST-CAN gateway functions

The following advantages are achieved by combining several control units in one module:

- Increased functionality by combining several systems

- Easy to expand/upgrade by means of software with corresponding interfaces

- Fewer plug connections therefore fewer potential fault sources

- Reduced package space for control units

Components

The car communication computer consists of several components:

Housing

CD-ROM drive

DVD drive

HIP-module
(host independence
positioning module)

Gyro sensor

Tuner module

Main board

Power board

Audio board

Memory module

Front panel

Front panel with Bluetooth
module (not at SOP)

PMC-card 1 for rear
compartment entertainment
(not at SOP)

PMC-card 2 open

PCMCIA-card for memory
expansion (not at SOP)

Electric fan

The car communication computer is accommodated in an aluminium casing. The size of the car communication computer corresponds to two radio DIN casings.

The following types of CD can be played on the CD-ROM drive:

- Audio CD

- Audio CD-ROM with MP3 files

When the navigation system is not in use, the DVD drive can also be used to play audio CDs or audio CD-ROMs with MP3 files.

The HIP module contains the GPS receiver that has the task of converting and decoding the signals received from the GPS aerial.:


The gyro sensor is a separate module that is connected via plug contacts to the main board and is secured by a screw.
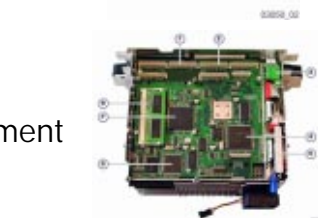

In addition to the CPU (Central Processing Unit) further processors and main memories are mounted on the main board. The main board also contains plug-in slots for expansion boards.

The power board is located at the rear of the car communication computer. The FAKRA main connector for the power supply and the MOST connector are secured on the power board. The main connector provides the interface to the vehicle electrical system.
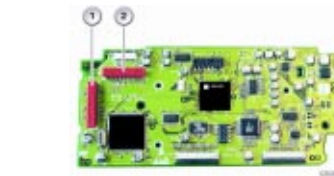
The ASK functions are located on the audio board. Two digital sound processors facilitate simultaneous conditioning of the audio signals and operation of the voice control system.
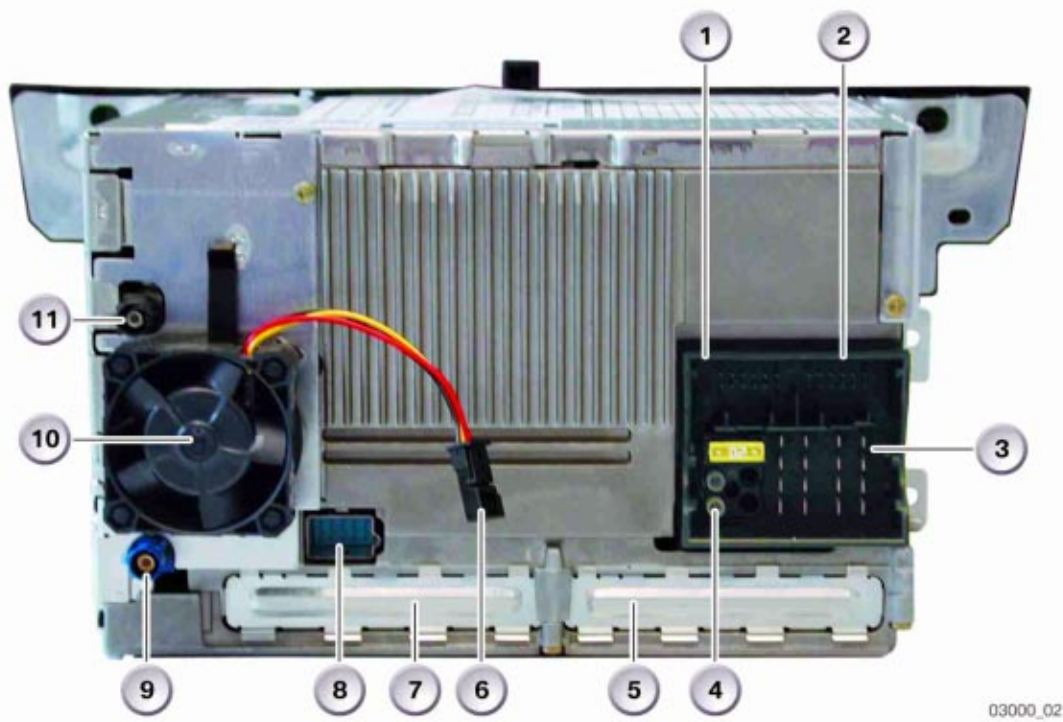
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Rear view of car communication computer

1. 12-pin connector, left
2. 12-pin connector, right
3. 16-pin connector
4. MOST connector
5. Cover for expansion card
6. Connection for fan motor

7. Cover for expansion card
8. LVDS connector
9. GPS aerial connector
10. Fan motor
11. Radio aerial connector
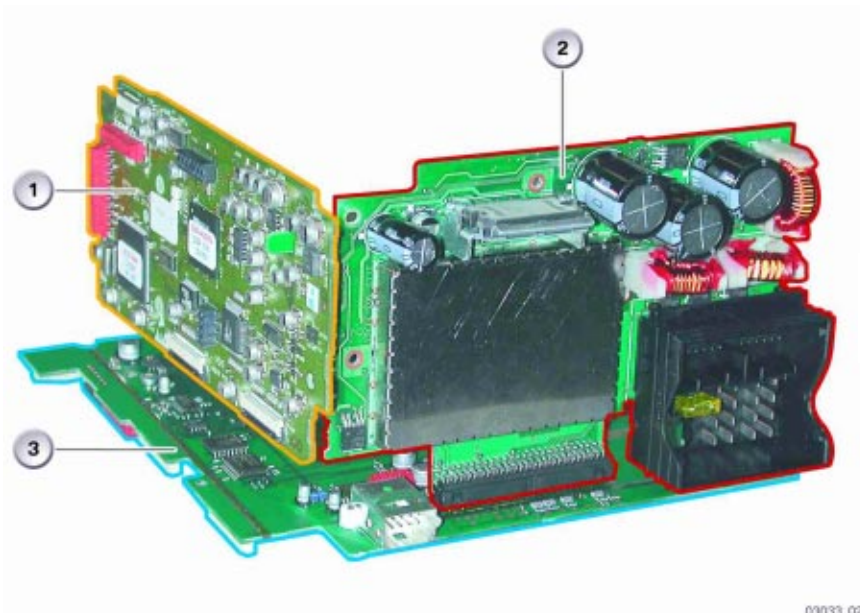
1. Audio Board
2. Power Board
3. Main Board

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Service Concept for the Car Communication Computer

The service concept is such that individual modules and parts of the car communication computer can be replaced in the event of malfunction, thus serving to reduce repair costs. A differentiation is made between electronic and mechanical parts.

Electronic Parts

Replacement of the following electronic parts is planned:

CD drive	DVD drive	Tuner module	HIP module
Gyro	Front panel	Audio board	Memory module
PMC cards	Electric fan		

Mechanical Parts

Following mechanical parts are available:

Top cover	Bottom cover	DVD drive retaining fixture
CD retaining fixture	DVD drive holder	CD drive holder
Cover PMC slot	Cover PCMCIA slot	Rubber mount for electric fan

Particular attention must be paid to electrostatic discharge ESD when working on the car communication computer. Disregard of the safety requirements may result in damage to the electronic components in the car communication computer.

Working on Electronic Components

Preparatory Work

The following points must be observed when working on electronic components of the car communication computer corresponding to the service concept:

- All work must be carried out on a conductive and earthed workbench.

- The special tool 12 7 192 is additionally used for this purpose.

- The earthing cable must be connected to a secure and reliable earthing point (water pipe, heating pipe, socket outlet earth). Before taking the parts out of their packaging, the person working on the components must first put on the wrist cuff in order to discharge himself. The electronic components are placed on the antistatic mat and also connected with the earthing cable.

Replacement
The electronic components must be replaced as described in the repair instructions and following the procedure described on SIP Electrostatic Fundamentals, while observing ESD safety measures.
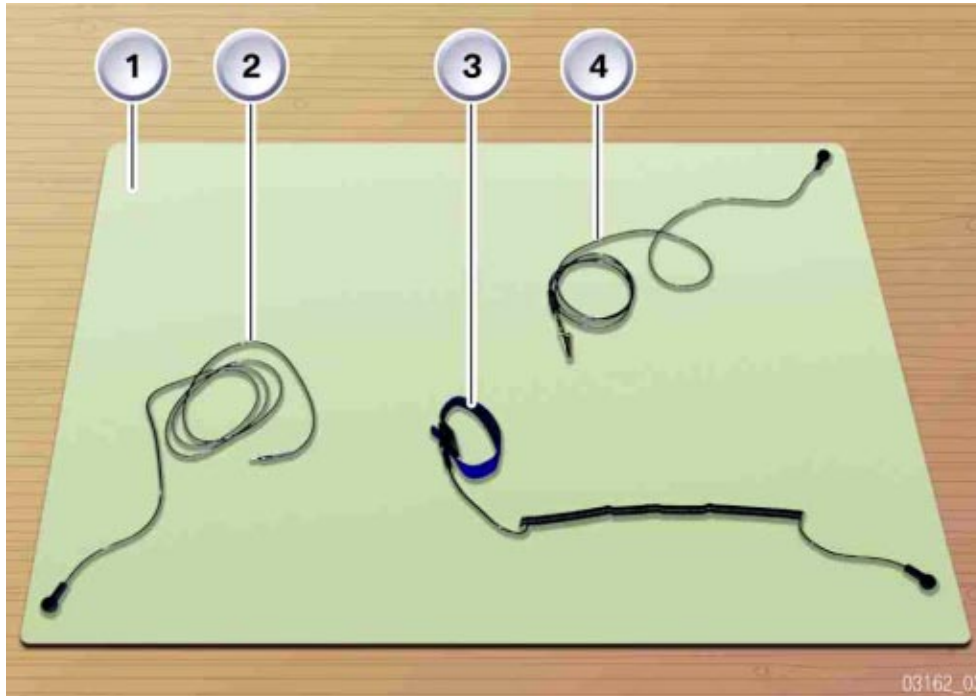
1. Antistatic Mat
2. Ground Strap Antistatic Mat
3. Wrist Strap
4. Ground Strap Component

Note: The Antistatic Mat at your Center may look different than the one shown here or at the training center. Remember the following when using the Antistatic Mat:

- **Ground the Antistatic Mat to the workbench using the attached lead**

- **Attach the Grounding strap to the component being serviced**

- **Always wear the wrist cuff.**

System Functions

The car communication computer comprises the following functions:

- Radio
- DVD navigation, Professional (map presentation)
- Voice control system
- Online platform
- Audio management
- ASK functions
- Driver for central information display
- MOST CAN gateway

Voice Control System

A voice control system High is integrated in the car communication computer. With this system, all functions shown in the CID can be controlled by voice commands. This system has the advantage that the hands need not be taken off the steering wheel while driving in order to change settings.

The SES can be used to control the following systems:

- Entertainment
- Communication
- Navigation
- Climate
- "5th Menu" setting

The voice control system makes use of specific voice commands. The voice control system sets up a dialogue with the user. Repeat requests are issued if the system did not understand a command.

System Integration

The voice control system is loaded as pure software in the car communication computer. The voice control system makes use of the memories and processors in the car communication computers as well as the hardware of other systems (e.g. microphones).

The two hands-free microphones in the front roof console are used in connection with the voice control system. The hands-free microphones are connected directly to the telematics control unit (TCU). The TCU sends the microphone signals via MOST to the car communication computer where they are processed in the DSP in order to execute the required functions.

Functional Principle of Voice Control System

System Start/End

The voice control system is activated/deactivated via the push-to-talk button (PTT) on the multifunction steering wheel or on the controller. For the first time, the PTT button on the controller makes it possible for the passenger to use the voice control system (SES). The SES is activated for the driver by briefly pressing the button and for the passenger by pressing and holding the button longer.

The SES is deactivated by again pressing one of the PTT buttons. Activation of the SES is indicated by a graphic display (PTT logo) in the status line of the CID. The system is active for about 5 seconds. If no input takes place during this period of time, the user is informed that no voice input was detected and the request for voice input is repeated. The voice control system is deactivated if again no input is made within 5 seconds.

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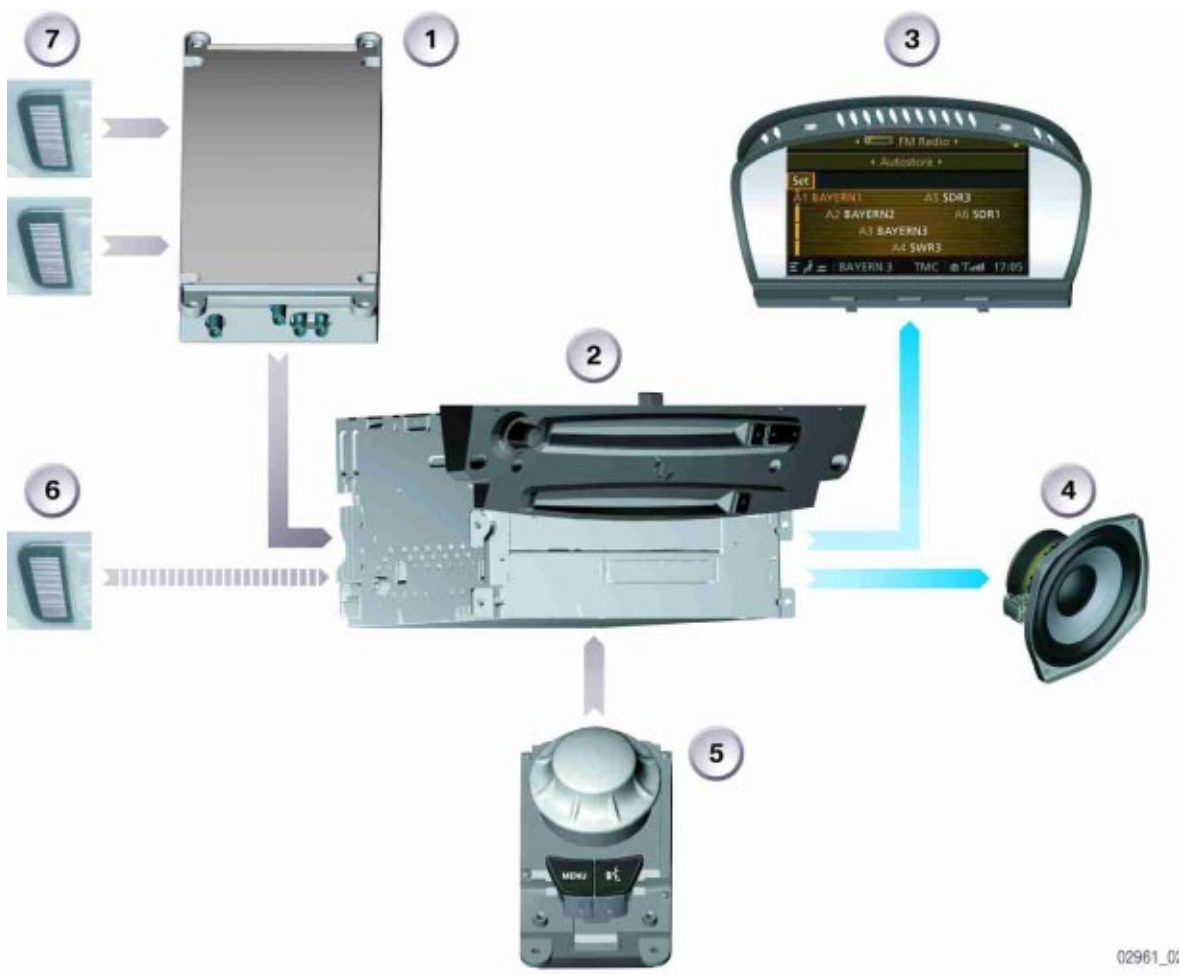
Workshop Exercise - CCC Disassembly

With the Instructor's assistance, remove and disassemble the CCC mockup using the Antistatic Mat.

1. *Remove CCC face plate*

2. *Remove housing top plate and Tuner Module (on RH side)*

3. *Remove CD -ROM drive and disconnect harness*
   (shown on the right)

4. *Turn CCC upside down and remove bottom cover plate*

5. *Remove HIP module - slide upwards and disconnect harness*
   (shown on the right)

6. *Release single screw and remove the gyro sensor*
   (shown on the right)

7. *Remove the Main Board surface screws*

   - *disconnect top ribbon cables (3)*

   - *disconnect bottom ribbon cables (2)*

   - *release fiber optic connector from rear main plug block*
     (in housing)

   - *remove main board (shown on the right)*

8. *Remove DVD drive from the front*
   (shown on the right)

9. *Remove Audio Board*
   (shown on the right)

10. *Remove the power board by sliding it out of the housing*
    (shown on the right)